

PU020393 (JP9172435) ON 8470

(19) Patent Agency of Japan (JP)

(12) Official report on patent publication (A)

(11) Publication number: 9-172435

(43) Date of publication of application: 30.06.1997

(51) Int.Cl. H04L 12/24 H04L 12/26

(21) Application number: 7-331287

(22) Date of filing: 20.12.1995

(71) Applicant: PFU LTD

(72) Inventor: Muto Eiko, Yamaguchi Osamu, Imafuku Hiroaki

(54) Title of the invention: Distributed managing system

(57) Abstract:

Problem to be solved: To distribute the load of a network by allowing a representative agent to pole in the state with each group closed and allowing agents to mutually monitor so as to automatically alternate the representative agent.

Solution: When an agent 5 transfers a frame to the agents 5 of high priority orders by referring to a monitoring table 7 and there is an agent 5 which does not respond to it but is restored, information that the agent 5 of the high priority order returns to be the representative agent is given to all of the other agents 5 within the group and a manager 2. On the other hand, when the authentication of a password and an access right in a frame is OK at the time of receiving the frame to which an access request from the manager 2 is set,

data is set to the frame, transmitted toward the network by addressing its own agent and received. When difference between received data and specified data is over a prescribed value, the manager 2 is informed of abnormality. A polling function is provided for each agent 5 like this.

[Claims]

[Claim 1] A network management system that manages an agent connected to a network, including a manager who formed a means that carried out a group division about an agent connected to a network, that sets an agent, a representation agent and a priority within groups involved as a frame, and to notifies a representation agent, a means that an agent's address and a priority in a group set as a frame that received the mentioned above notice are set as a monitoring table and is made to transmit and save to other agents in a group, and a representation agent in whom the agent concerned does an abnormality notice to the mentioned above manager with a frame when a frame is transmitted to an agent who set it as a monitoring table and the response does not exist or when an abnormality notice is received from an agent with a frame.

[Claim 2] A network management system that manages an agent connected to a network, including a manager who formed a means that carried out a group division about an agent connected to a network, that sets an agent and a representation agent within groups involved as a frame, and notifies a representation agent, a means that determine an address of an agent in a group set as a

frame that received the mentioned above notice and an agent's priority and it is set as a monitoring table and is made to transmit and save to other agents in a group, and a representation agent in whom the agent concerned does an abnormality notice to the mentioned above manager with a frame when a frame is transmitted to an agent who set it as a monitoring table and the response does not exist or when an abnormality notice is received from an agent with a frame.

[Claim 3] The decentralized administration system according to claim 1, claim 2 provided with an agent who formed a means to be alike, to determine an agent of the following priority concerned as a representation agent, and to notify other agents and managers of all the in a group, when a frame is transmitted to a high agent of a priority with reference to the mentioned above monitoring table and the response does not exist.

[Claim 4] The decentralized administration systems according to claim 1, claim 3 provided with an agent who formed a means to notify other agents and managers of all the in a group of it having been alike and a high agent of a priority having returned to a representation agent, when there was what transmitted a frame to a high agent of a priority with reference to the mentioned above monitoring table, and did not have the response and it is restored.

[Claim 5] The decentralized administration system in which difference with data specified as received data exceeded a predetermined value or is characterized by including an agent who formed a means to perform an

abnormality notice to a manager at the time of below a predetermined value, when attestation of the right to access is O.K., sets data as a frame, and it transmits and receives towards a network to own agent, the frame that sets the access request from the manager is received and the password in a frame concerned.

[Detailed description of the invention]

[0001]

[Field of the invention] This invention relates to the network management system that manages the agent connected to the network.

[0002]

[Description of the prior art] Conventionally, in the system by which a manager and a plurality of agents are connected to the network, the manager was performing all frame transmission for the MIB polling that reads the frame transmission and data for each agent's survival check polling.

[0003]

[Problems to be solved by the invention] Since the manager was performing conventionally all of polling of a survival check or the polling that reads data separately to each agent connected to the network, there was a problem that huge load will be applied to the network to which the manager is connected.

[0004] A polling function is given to an agent in order that this invention may solve these problems, a representation agent polls in the state where it closed within each flap, a manager is notified only at the time

of a change of state or an abnormal occurrence and an agent health check is performed, a representation agent's automatic substitution is performed, and it aims at planning network load sharing and securing reliability.

[0005]

[Means for solving the problem] With reference to drawing 1, the means for solving a technical problem is explained. In drawing 1, the manager 2 supervises a plurality of agents 5 connected to a network, and includes the surveillance intelligence setting-out means 3, the agent management table 4, etc.

[0006] The surveillance intelligence setting-out means 3 detecting the agent 5 connected to a network, and registering him into the agent management table 4, carrying out a group division about the agent 5 who registered or determining a representation agent from inside of an agent in a group.

[0007] The agent management table 4 registers information about the agent 5 of a surveillance object connected to a network. The agent 5 is supervised by the manager 2 connected to a network (terminal) and includes the polling means 6, the agent management table 4, the monitoring table 7.

[0008] That the polling means 6 polls a frame and supervises an agent. The monitoring table 7 registers an agent, a priority, the monitor time interval T, etc. of a surveillance object.

[0009] Next, operation is explained. About an agent connected to a network, the manager's 2 surveillance

intelligence setting-out means 3 carries out a group division, and an agent within groups involved, sets a representation agent and a priority as a frame, and it transmits to a representation agent, sets an agent's address and a priority in a group set as a frame which the representation agent 5 received as the monitoring table 7 and it is made to transmit and save to other agents 5 in a group, when a frame is transmitted to an agent who set it as the monitoring table 7 and the response does not exist or when an abnormality notice is received from the agent 5 with a frame, with a frame, the agent 5 concerned is doing an abnormality notice to the manager 2 and it is making to him.

[0010] The manager's 2 surveillance intelligence setting-out means 3 carries out a group division about the agent 5 connected to a network, sets the agent 5 and a representation agent within groups involved as a frame, and transmits to a representation agent, an address of the agent 5 in a group set as a frame that the representation agent 5 received, sets a determined priority as the monitoring table 7, and it is made to transmit and save to other agents 5 in a group, when a frame is transmitted to the agent 5 who set it as the monitoring table 7 and the response does not exist or when an abnormality notice is received from the agent 5 with a frame, with a frame, the agent 5 concerned is doing an abnormality notice to the manager 2 and it is making to him.

[0011] In this case, when the agent 5 transmits a frame to the high agent 5 of a priority with reference to the monitoring table 7 and the response does not exist,

determines the agent 5 of the following priority concerned as a representation agent and is trying to notify all other agents 5 and managers 2 in a group.

[0012] When there was what the agent 5 transmitted a frame to the agent 5 of high priority with reference to the monitoring table 7, and did not have the response and it is restored. He is trying to notify other agents 5 and managers 2 of all the in a group of it having been alike and the agent 5 of high priority having returned to a representation agent.

[0013] The frame that sets the access request from the manager is received and the password in a frame concerned, when attestation of the right to access is O.K., data is set as a frame, and difference with data that transmitted to own agent towards a network, received, and was specified as received data exceeded a predetermined value or is made to perform an abnormality notice to the manager 2 at the time of below a predetermined value.

[0014] Thus, it becomes possible by giving each agent 5 a polling function, and an agent's polling, and notifying the manager 2 only at the time of a change of state or an abnormal occurrence to plan network load sharing.

[0015]

[Embodiment of the invention] Next, an embodiment of the invention and operation are explained in details one by one using drawing 11 from drawing 1.

[0016] Drawing 1 shows the system configuration drawing of this invention. Here, the groups 1, 2, 3 enclosed with a dotted line show the range of the group

that is determined arbitrarily preliminary. Here, suppose that it determined as follows.

[0017]

Group 1: Manager #00

Group 2: Agent #11

Agent #12

Agent #13

Group 3: Agent #21

Agent #22

Agent #23

Next, a procedure in case the manager 2 detects all the agents' 5 address connected to the network by broadcasting and sets it as the agent management table 4 according to an order shown on the flow chart of drawing 2 is explained in details.

[0018] Drawing 2 shows the setting-out flow chart (1) of this invention. In drawing 2, S1 creates a frame (Echo). This creates a destination address (ff: express the fraud cast), a transmission source address (#00: the manager's 2 address), and the frame that set up CDC (Echo: response request data) like the frame (Echo) of (a) of drawing 5 mentioned below.

[0019] S2 transmits by broadcasting. This transmits the frame (Echo) of broadcasting created by S1 to a network. An agent receives S3. The agent 5 receives the frame (Echo) from which this was transmitted to the network by S2.

[0020] S4 is distinguished in a response important point. In YES, it progresses S5. In NO, since own agent was proved that it is response needlessness, the received frame is disregarded (abandonment).

[0021] Since S5 was proved by S4 that it is a response important point, it creates a frame (EchoReply). This like the frame (EchoReply) of (b) of drawing 5 mentioned below, a destination address (#00: the manager's 2 address), a transmission source address (#11: the agent's 5 address), and the frame that set up CDC (EchoReply: response data) are created.

[0022] S6 transmits. This transmits the frame (EchoReply) created by S5 to a network.

The manager 2 of an address receives the frame (EchoReply) to which S7 was transmitted by S6.

[0023] S8 performs registration to a management table. This registers the agent's 5 address taken out from the received frame (EchoReply), and a response of a frame (Echo) into the agent management table 4 of drawing 1 (see drawing 6).

[0024] By the response frame from the agent 5 which the manager 2 broadcasts a frame and is connected to the network by S1 to S8 of a more than, the address of the agent 5 of all the surveillance objects, it becomes possible to search and register, as shown on the agent management table 4 of drawing 6 that is mentioned below owner of a frame (Echo).

[0025] S9 creates a frame (SNMP demand). This like the frame of (c) of drawing 5 (SNMP demand) mentioned below, the frame that sets up a destination address (#11: the agent's 5 address), a transmission source address (#00: the manager's 2 address), and protocol data (GetRequestPDU: PDU requested data) is created.

[0026] S10 transmits. This transmits the frame (SNMP demand) created by S9 to a network. An agent receives S11. The agent 5 of an address receives the frame (SNMP demand) from which this was transmitted to the network by S10.

[0027] S12 is distinguished in a response important point. In YES, it progresses S13. In NO, since own agent was proved that it is response needlessness, the received frame is disregarded (abandonment).

[0028] Since S13 was proved by S12 that it is a response important point, it creates a frame (SNMP response). As this shows the frame of (d) of drawing 5 (SNMP response) mentioned below, the frame which set up a destination address (#00: the manager's 2 address), a transmission source address (#11: the agent's 5 address), and protocol data (GetResponsePDU: PDU response data) is created.

[0029] S14 transmits. This transmits the frame (SNMP response) created by S13 to a network. The manager 2 of an address receives the frame (SNMP response) to which S15 was transmitted by S14.

[0030] S16 performs registration to a management table. This registers the agent's 5 address taken out from the received frame (SNMP response) and PDU (Protocol Data Unit) into the agent management table 4 of drawing 1.

[0031] S17 completes an agent's recognition. It means the manager's 2 transmitting a frame to the agent 5 of a surveillance object by S17 from the above S9, registering in response to the reply of PDU data and

completing the agent's 5 recognition connected to the network of a surveillance object. And drawing 3 and drawing 4 are performed after (A).

[0032] Drawing 3 shows the priority determination flow chart by the manager of this invention. This is a flow chart in case the manager 2 determines the priority of the agent in a group and notifies and sets it as a representation agent.

[0033] The group division of S21 is carried out in drawing 3. This carries out the flap division of the agent 5 like the group 2 and the group 3, for example like drawing 1. S22 determines a representation agent for every group. For example, the representation agent of the group 2 of drawing 1 is determined as #13.

[0034] S23 determines an alternative agent for every group. For example, #12 and #11 are determined as an alternative agent to representation agent #13 of the group 2 of drawing 1.

[0035] S24 creates a frame (agent). This creates the following frames shown on the frame of (e) of drawing 5 (agent) mentioned below, for example.

[0036]

- Destination address: representation agent #13
- Transmission source address: manager #00
- Agent data: Representation agent #13

Representation agent #12 ...

priority: #13, #12, #11

monitor-time interval: T1

S25 transmit to a network.

[0037] A representation agent receives S26, S27 is saved to a monitoring table, this is shown in the monitoring table 7 of drawing 7 that is taken out from the frame received by S26, and is mentioned below.

[0038]

Agent	Priority	Monitor time interval
#13	1	T1
#12	2	T1
#11	3	T1

A representation agent transmits S28 to an alternative agent. This transmits the contents of the monitoring table 7 set up by S27 to an alternative agent (all the agents other than a representation agent).

[0039] An alternative agent saves S29 to a monitoring table. By the above, the manager 2 determines the representation agent, a priority, and a monitor time interval for every group part and group about the agent connected to the network and transmits to a group's representation agent. Each representation agent saves at the self monitoring table 7 that received this, and transmits to all other alternative agents, and makes the monitoring table 7 save. All the agents have the same monitoring table 7 for every group by this, when the representation agent who mentions later stops operating, an alternative agent substitutes, and a representation agent receives and summarizes the abnormality information in a group at the time of an abnormal occurrence and it transmits to the manager 2 and makes

it possible to reduce the load between networks and the manager's 2 load.

[0040] Drawing 4 shows the priority determination flow chart by the representation agent of this invention. This is a flow chart in case the representation agent who received the notice from the manager 2 determines and sets up the priority of the agent in a group.

[0041] The group division of S31 is carried out in drawing 4. This carries out the division of the agent 5 like the group 2 and the group 3, for example like drawing 1. S32 determines a representation agent for every group. For example, the representation agent of the group 2 of drawing 1 is determined as #13.

[0042] S33 creates a frame (agent). This creates the following frames, for example as a frame (agent).

- Destination address: representation agent #13
- Transmission source address: manager #00
- Agent data: representation agent #13

S34 transmits to a network.

[0043] A representation agent receives S35. S36, a representation agent determines an alternative agent and a priority. This sets an alternative agent to agent #12 and #11, for example, and determines a priority and a monitor time interval as follows.

[0044]

Agent		Priority	Monitor time interval
#13	1	T1	
#12	2	T1	
#11	3	T1	

S37 is saved to a monitoring table. It is saved as shown in the monitoring table 7 of drawing 7 mentioned below based on the priority determined by S36.

[0045]

Agent		Priority	Monitor time interval
#13	1	T1	
#12	2	T1	
#11	3	T1	

A representation agent transmits S38 to an alternative agent. This transmits the contents of the monitoring table 7 set up by S37 to an alternative agent (all the agents other than a representation agent).

[0046] An alternative agent saves S39 to a monitoring table, by the above, the manager 2 about the agent connected to the network group part, the representation agent is notified for every group, a representation agent determines and saves the alternative agent, priority and monitor time interval in a group and it transmits to other agents in a group, and is made to save in the monitoring table 7. All the agents have the same monitoring table 7 for every group by this, when the representation agent who is mentioned below stops operating, an alternative agent substitutes or a representation agent receives and

summarizes the abnormality information in a group at the time of an abnormal occurrence, it transmits to the manager 2 and it becomes possible to reduce the load between networks and the manager's 2 load.

[0047] Drawing 5 shows the example of a frame of this invention (1). (a) of drawing 5 shows the example of a frame (Echo). This is an example of the frame created by S1 of drawing 2 mentioned above, and sets up the following item of a graphic display.

[0048] - Destination address: ff (broadcasting is expressed)

- Transmission source address: #00 (a manager's address is expressed)

- CDC: Echo (response request data is expressed)

(b) of drawing 5 shows the example of a frame (EchoReply). This is an example of the frame created by S5 of drawing 2 mentioned above and sets up the following item of a graphic display.

[0049] - Destination address: #00 (the manager's 2 address is expressed)

- Transmission source address: #11 (an agent's address is expressed)

- CDC: EchoReply (response data is expressed)

(c) of drawing 5 shows the example of a frame (SNMP demand). This is an example of the frame created by S9 of drawing 2 mentioned above and sets up the following item of a graphic display.

[0050] - Destination address: #11 (an agent's address is expressed)

- Transmission source address: #00 (a manager's address is expressed)

- Protocol-data: GetRequestPDU (PDU requested data is expressed)

(d) of drawing 5 shows the example of a frame (SNMP response). This is an example of the frame created by S13 of drawing 2 mentioned above and sets up the following item of a graphic display.

[0051] - Destination address: #00 (a manager's address is expressed)

- Transmission source address: #11 (an agent's address is expressed)

- Protocol data: GetResponsePDU (PDU response data is expressed)

(e) of drawing 5 shows the example of a frame (agent). This is an example of the frame created by S24 of drawing 3 mentioned above, and sets up the following item of a graphic display.

[0052]

- Destination address: #13 (group 2 representation agent's address is expressed)

- Transmission source address: #00 (a manager's address is expressed)

- Agent data: representation agent: #13
representation agent: #12...

Priority: #13, #12...

Monitor time interval: T1

Drawing 6 shows the example of an agent management table of this invention. This agent management table 4 looks like all each agent of the manager 2 and a required portion, provides them, and registers and manages the following item of a graphic display.

[0053]

- Agent address: #11
- Existence of a frame (Echo) response: yes
- Existence of a frame (SNMP) response: yes
- MIB community name: A
- Right to access: read

Here, an MIB community name sets up a password (MIB community name) and the right to access (as for the time of read, only reference permits reference and updating at the time of permission and read/write) in case the manager 2 accesses data from a representation agent etc., for example, agent #11, only at the time of the access request by which the manager 2 set a MIG community name «A» and read as the frame, it can become effective, agent #11 can set predetermined data (management information base) as a frame, it can reply to the manager 2 and a manager can read it.

[0054] Drawing 7 shows the example of a monitoring table of this invention. All the agents 5 in a group have the same contents and this monitoring table 7 sets up a priority and a monitor time interval about the agent in a group. For example, it sets up as follows a graphic display.

[0055]

Agent	Priority	Monitor time interval
#13	1	T1
#12	2T	1

Here, for the agent of «1», a priority is a representation agent. For the agent after «2», a priority is an alternative agent, and a representation agent is substituted when a representation agent stops operating (it is mentioned below using drawing 8 and drawing 9).

[0056] Next, according to an order shown on the flow chart of drawing 8, the procedure of substitution of the representation agent by frame reception is explained in details. Drawing 8 shows the substitution processing flow chart by the frame reception of this invention.

[0057] In drawing 8, S41 distinguishes whether fixed time lapse was carried out. In YES, it progresses S42. In NO, it stands by. A representation agent creates the frame (Echo) to each agent and transmits S42 to an alternative agent. This transmits the frame that set up the alternative agent's address as a destination address among the frames (Echo) of (a) of drawing 5 which the representation agent mentioned above.

[0058] S43 distinguishes whether the alternative agent received in fixed time. In YES, it progresses S44. Since it became clear that the representation agent stopped operating in NO, it changes to a representation agent by S60, and a management table is transmitted to the agent of other member in updating and a group by S61 (it is mentioned below).

[0059] Since it became clear to have received the frame (Echo) in fixed time by S43, S44 is distinguished in a response important point. In YES, it progresses S45. In NO, the frame received since it was proved that it is response needlessness is disregarded (cancellation).

[0060] S45 transmits a frame (EchoReply) with creation. This is frame (EchoReply) of (b) of drawing 5 mentioned above,

- Source address: address #13 of representative agent
- Transmission original address: address #12 of alternative agent
- Control data: EchoReply: Response data

It sets and it transmits.

[0061] S46 distinguishes whether the representation agent received the frame (EchoReply) in fixed time. In YES, it progresses S47. In NO, it progresses to S56, and preservation and the manager 2 are notified of the information on the purport (abnormal occurrence) that there is no response, from an alternative agent (it is mentioned below).

[0062] Since S47 turned out to have received in fixed time by YES of S46, it transmits the frame (SNMP demand) to each agent with creation. As the frame of (c) of drawing 5 mentioned above (SNMP demand),

- Source address: address #12 of alternative agent
- Transmission original address: address #13 of representative agent
- Protocol data: GetRequestPDU: PDU requested data

It sets and transmits.

[0063] S48 distinguishes whether the alternative agent received in fixed time. In YES, it progresses S49. Since it became clear that the representation agent stopped operating in NO, it changes to a representation agent by S60, and a management table is transmitted to the agent of other member in updating and a group by S61 (it is mentioned below).

[0064] Since it became clear to have received the frame (SNMP demand) in fixed time by S48, S49 is distinguished in a response important point. In YES, it progresses S50. In NO, the frame received since it was proved that it is response needlessness is disregarded (cancellation).

[0065] S50 transmits a frame (SNMP response) with creation. As the frame of (d) of drawing 5 mentioned above (SNMP response),

- Source address: address #13 of representative agent
- Transmission original address: address #12 of alternative agent
- Protocol data: GetResponsePDU: PDU response data

It sets and transmits.

[0066] S51 distinguishes whether the representation agent received the frame (SNMP response) in fixed time. In YES, it is recognized as normal at S52 and progresses to S53. In NO, it progresses to S57 and preservation and the manager 2 are notified of the information on the purport (abnormal occurrence) that there is no response, from an alternative agent (it is mentioned below).

[0067] S53 transmits an agent management table to an alternative agent. S54 receives and saves the agent management table transmitted by S53.

[0068] In NO of S51, S55 changes the SNMP response of an agent management table by S57 at nothing (see drawing 6), the manager would be corresponded and notified by S58, and it sets up and transmits to a frame, and the manager 2 who received this frame takes out and a message (for example, purport of an abnormal occurrence to an alternative agent) is displayed on a screen and a log is extracted.

[0069] Since S60 turned out to have not received a frame in fixed time by NO of S43 or NO of S48, if the representation agent is not operating, it will be judged (failure and judgment) and changes the alternative agent of the following priority to a representation agent.

[0070] S61 updates an agent management table, transmits to the agent of other member in a group, and makes him update. By the above, a representation agent transmits a frame to all the alternative agents in a group for every fixed time, when an alternative agent does not receive a frame in fixed time, while changing the alternative agent of the next priority of the monitoring table 7 to a representation agent of the agent management table 4, a representation agent's operation defect (concrete, nothing of a response of a frame (Echo) and nothing of a response of a frame (SNMP)), it sets up, other agents in a group are notified and informed, a new representation agent is notified after this at the time of an abnormal occurrence, etc., and it

enables this new representation agent to inform the manager 2 about the purport of an abnormal occurrence of an alternative agent. When a representation agent does not receive a frame in fixed time from an alternative agent, operation of the applicable substitution agent of the agent management table 4, a defect (concrete, nothing of a response of a frame (Echo) and nothing of a response of a frame (SNMP)), it sets up, and other agents in a group are notified and informed, and it becomes possible to inform the manager 2 about the purport of an abnormal occurrence of an alternative agent. These enable it to carry out a health check between representation agent and an alternative agent.

[0071] Next, according to an order shown on the flow chart of drawing 9, the substitution processing by polling is explained in details. Drawing 9 shows the substitution processing flow chart by polling of this invention.

[0072] In drawing 9, S71 distinguishes whether the alternative agent did fixed time lapse. In YES, it progresses S72. In NO, it stands by. S72 creates the frame (SNMP demand) to each agent (see (c) of drawing 5).

[0073] S73 transmits to the agent in which a priority is higher than itself. The high representation agent of a priority receives the frame to which S74 was transmitted by S73.

[0074] S75 creates a frame (SNMP response) (see (d) of drawing 5). S76 transmits. S77 distinguishes whether it received in fixed time, after transmitting by S73. In YES, it distinguishes in restoration by S78 and progresses to S79 at the time of YES, and the frame received at the time of NO is disregarded (cancellation). On the other hand, since there was no response of a representation agent to a frame in NO of S77, a representation agent is changed to the alternative agent of the following priority by S84 and it progresses to S79.

[0075] S79 updates an agent management table. Since this turned out to have restored the representation agent in YES of S78, it is working in the representation agent concerned of an agent management table (the response of a frame (Echo) specifically) and the response of a frame (SNMP) owner, it did not carry out or the representation agent stopped operating in YES of S77, not working (it broke down) (concrete nothing of a response of a frame (Echo) and nothing of a response of a frame (SNMP)) in the representation agent concerned of an agent management table, since it became clear it carries out or updates.

[0076] S80 transmits to the agent of other member, and makes the contents of the agent management table 4 the same of all the agents 5 in a group. When it becomes clear that the representation agent restored S81 by YES of S78, an old representation agent returns to an alternative agent.

[0077] A representation agent receives the contents of the agent management table in which S82 has been transmitted by S80. When it becomes clear that the representation agent restored S83 by YES of S78, corresponding to the old representation agent having returned to the alternative agent, the restored representation agent returns to a basis.

[0078] By the above, when an alternative agent transmits a frame to the high agent of a priority for every fixed time and does not receive a response frame in fixed time, change to a representation agent, and set that as the agent management table 4, and the agent of other member in a group is transmitted and notified, it becomes possible to change and to change automatically the representation agent of notifying the manager 2 when a new representation agent supervises an alternative agent and receives the time of malfunction detection or an abnormality notice. When a representation agent is restored, a change and a representation agent are returned for the present representation agent to the original alternative agent.

[0079] Next, according to an order shown on the flow chart of drawing 10, the substitution processing by MIB polling is explained in details. Drawing 10 shows the MIB polling flow chart of this invention.

[0080] In drawing 10, S91 creates a frame (polling). This creates the frame (polling) that set up the following item, as shown on (a) of drawing 11 mentioned below.

[0081]

- Destination address: address #13 of an agent
- Transmission source address: address #00 of a manager
- Trap data: MIB name (for example, the «total number of send data»)

Polling interval

Threshold

The type of trap

S92 transmits.

[0082] S93, an agent receives a frame. S94 distinguishes whether the frame received by S93 went through the polling interval. In YES, a frame (MIB demand) is created by S95. This creates the frame (MIB demand) that set up the following item, as shown on (b) of drawing 11 mentioned below.

[0083]

- Destination address: address #13 of an agent (own agent's address)
- Transmission source address: a manager's address #00
- Management information base: MIB community name

Right to access

MIB name

S96 transmits.

[0084] S97 receives within the same node (it receives within the same agent's node). S98 creates a frame (MIB response).

This creates the frame (MIB response) that set up the following item, as shown on (c) of drawing 11 mentioned below.

[0085] - Destination address: address #00 of a manager

-Transmission source address: an agent's address #13

- Management information base: The response data of MIB

S99 transmits.

[0086] S100 receives. As for S101, that the MIB value (management information base) received by S100 was specified preliminary distinguishes whether it is larger than a value that spreads, for example. Since it turned out to be unusual in YES, it progresses to S102. In NO, it returns and repeats S94.

[0087] S102 creates a frame (trap). This creates the frame (trap) that sets up the following item, as shown on (d) of drawing 11 mentioned below.

- Destination address: address #00 of a manager

- Transmission source address: address #13 of an agent

- Trap data: community name for trap

Type of trap (for example, purport that the «total number of send data exceeded the threshold)

S103 transmits.

[0088] A manager receives S104. S105 displays on a screen the contents set as the frame received by S104 as a message.

[0089] S106 extracts a log, by the above, the manager 2 transmits a frame (polling) to the agent 5, and the agent 5 creates a frame based on this, transmit and receive within the same node, and the MIB value of the result a threshold, for example, when it exceeds, it is alike, a frame (trap) is created, the manager 2 is notified of an abnormality content, and it becomes possible on a screen to extract a display and a log about the contents of an abnormal occurrence as a message.

[0090] Drawing 11 shows the example of a frame of this invention (2). (a) of drawing 11 shows the example of a frame (polling). This is an example of the frame created by S91 of drawing 10 mentioned above and sets up the following item of a graphic display.

[0091]

- Destination address: address #13 of an agent
- Transmission source address: address #00 of a manager
- Trap data: MIB name (for example, the «total number of send data»)

Polling interval Threshold (b) of type of trap drawing 11 shows the example of a frame (MIB demand). This is an example of the frame created by S95 of drawing 10 mentioned above, and sets up the following item of a graphic display.

[0092]

- Destination address: address #13 of an agent
- Transmission source address: address #00 of a manager

- Management information base: MIB community name (equivalent to a password)

Right to access (for example, read (reference) etc.)

MIB names (the target data name etc. to access)

(c) of drawing 11 shows the example of a frame (MIB response). This is an example of the frame created by S98 of drawing 10 mentioned above, and sets up the following item of a graphic display.

[0093] - Destination address: address #00 of a manager

- Transmission source address: address #13 of agent

- Management information base: response data of MIB

(d) of drawing 11 shows the example of a frame (trap).

This is an example of the frame created by S102 of drawing 10 mentioned above, and sets up the following item of a graphic display.

[0094]

- Destination address: address #00 of a manager

- Transmission source address: address #13 of an agent

- Trap data: community name for trap

Type of trap (for example, «purport that the total number of send data exceeded the threshold»)

[0095]

[Effect of the invention] As explained above, according to this invention, since a polling function is given to the agent 5, an agent polls and the manager 2 is notified only at the time of a change of state or an abnormal occurrence, network load sharing can be planned.

[Brief description of the drawings]

[Drawing 1] is a system configuration drawing of this invention.

[Drawing 2] is a setting-out flow chart (1) of this invention.

[Drawing 3] is a priority determination flow chart by the manager of this invention.

[Drawing 4] is a priority determination flow chart by the representation agent of this invention.

[Drawing 5] is an example of a frame of this invention (1).

[Drawing 6] is an example of an agent management table of this invention.

[Drawing 7] is an example of a monitoring table of this invention.

[Drawing 8] is a substitution processing flow chart by the frame reception of this invention.

[Drawing 9] is a substitution processing flow chart by polling of this invention.

[Drawing 10] is an MIB polling flow chart of this invention.

[Drawing 11] is an example of a frame of this invention (2).

[Description of numerals]

2: Manager

3: Surveillance intelligence setting-out means

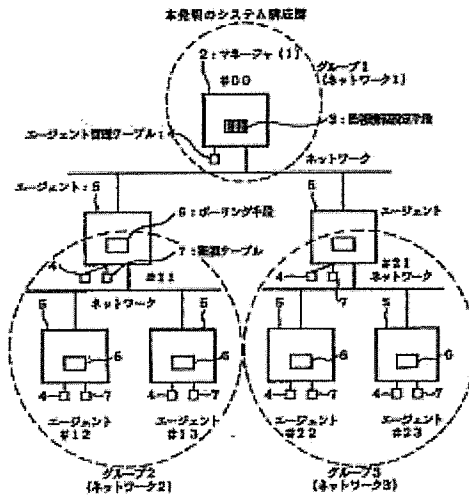
4: Agent management table

5: Agent

6: Polling means

7: Monitoring table

Drawing 1

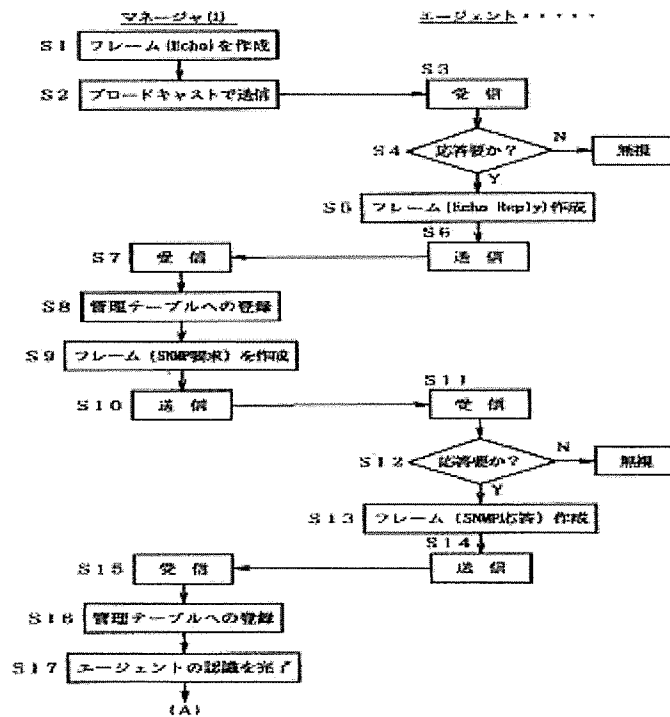


Drawing 6

本発明のエージェント管理テーブル例
エージェント管理テーブル (マネージャ1)

エージェント アドレス	フレーム (Echo) の応答有無	フレーム (Echo) の応答有無	MTI コミュニ ニティ名	アクセス権
#11	有	有	A	read
#12	有	有	A	read-write

Drawing 2



Drawing 7

本発明の監視テーブル例

1

エージェント	優先順位	監視対象範囲
#13	1	T1
#12	2	

Drawing 11

本発明のフレーム例 (その2)

(a) フレーム (ポーリング)

宛先アドレス	送信元アドレス	トラップデータ
#13	#00	<ul style="list-style-type: none"> ・MIB名 (例: 総送信データ数) ・ポーリング間隔 ・しきい値 ・トラップ種別

(b) フレーム (MIB要求)

宛先アドレス	送信元アドレス	MIBデータ
#13	#00	<ul style="list-style-type: none"> ・MIBコミュニティ名 ・アクセス権 ・MIB名

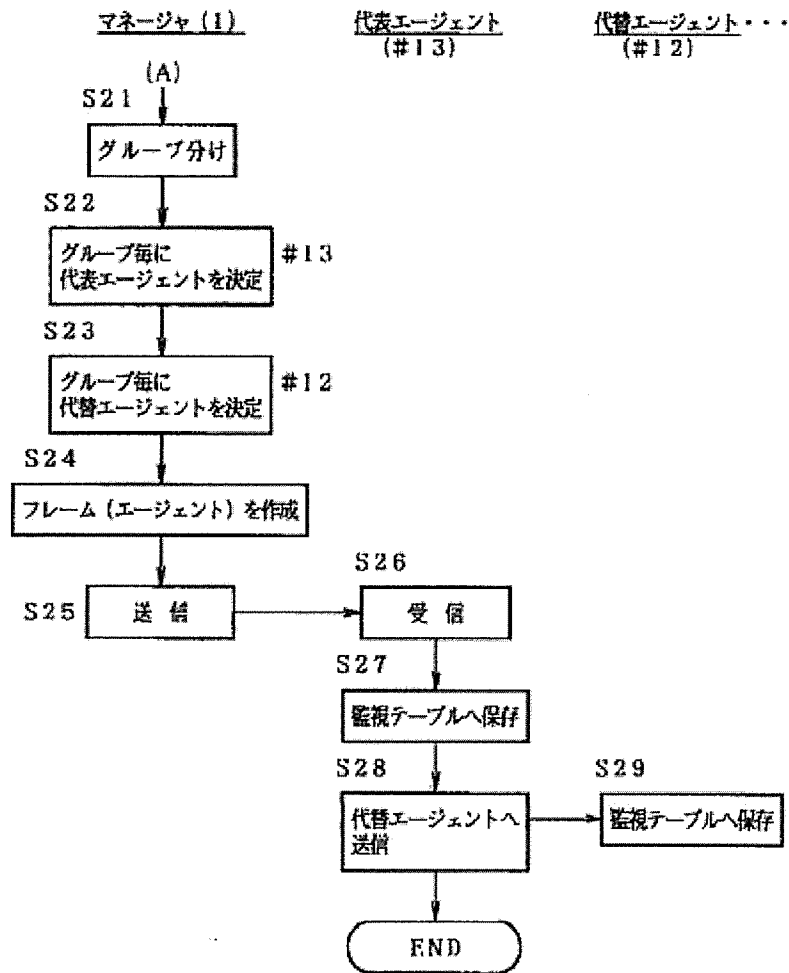
(c) フレーム (MIB応答)

宛先アドレス	送信元アドレス	MIBデータ
#00	#13	・MIBの応答データ

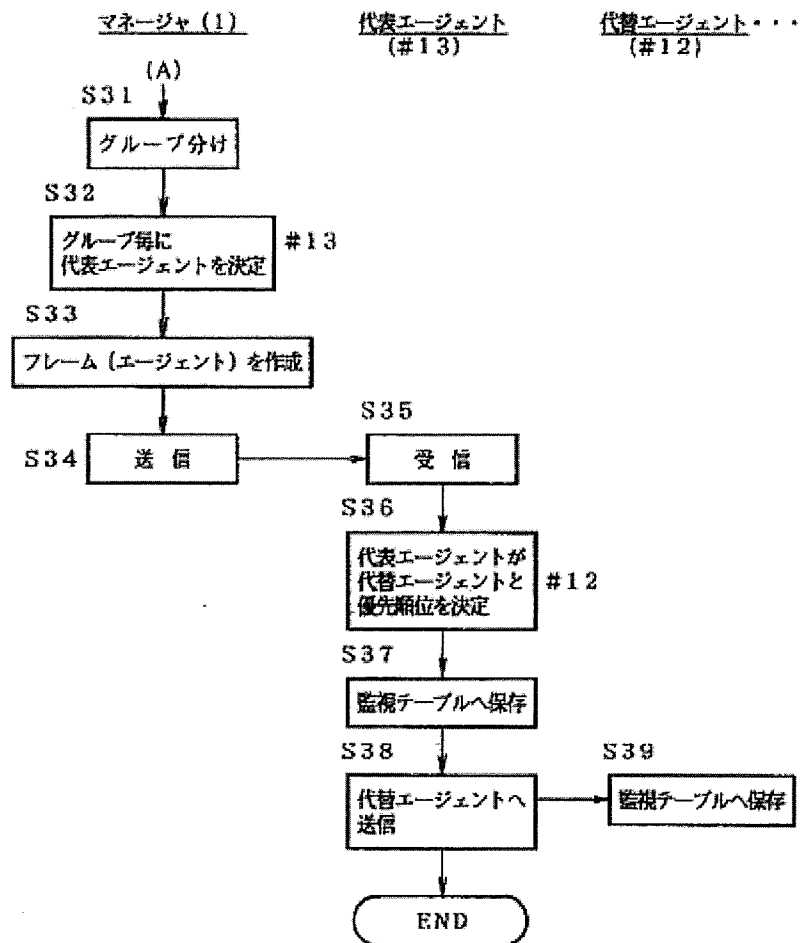
(d) フレーム (トラップ)

宛先アドレス	送信元アドレス	トラップデータ
#00	#13	<ul style="list-style-type: none"> ・トラップ用コミュニティ名 ・トラップ種別 (例: 総送信データ数がしきい値を超えた時)

Drawing 3



Drawing 4



Drawing 5

(a) フレーム (Echo)

宛先アドレス	送信元アドレス	コントロールデータ
ff	#00	Echo: 応答要求データ
{ ff : ブロードキャスト 上記以外: 固有の宛先 }		

(b) フレーム (EchoReply)

宛先アドレス	送信元アドレス	コントロールデータ
#00	#11	EchoReply: 応答データ

(c) フレーム (SNMP要求)

宛先アドレス	送信元アドレス	プロトコルデータ
#11	#00	GetRequestPDU: PDU要求データ

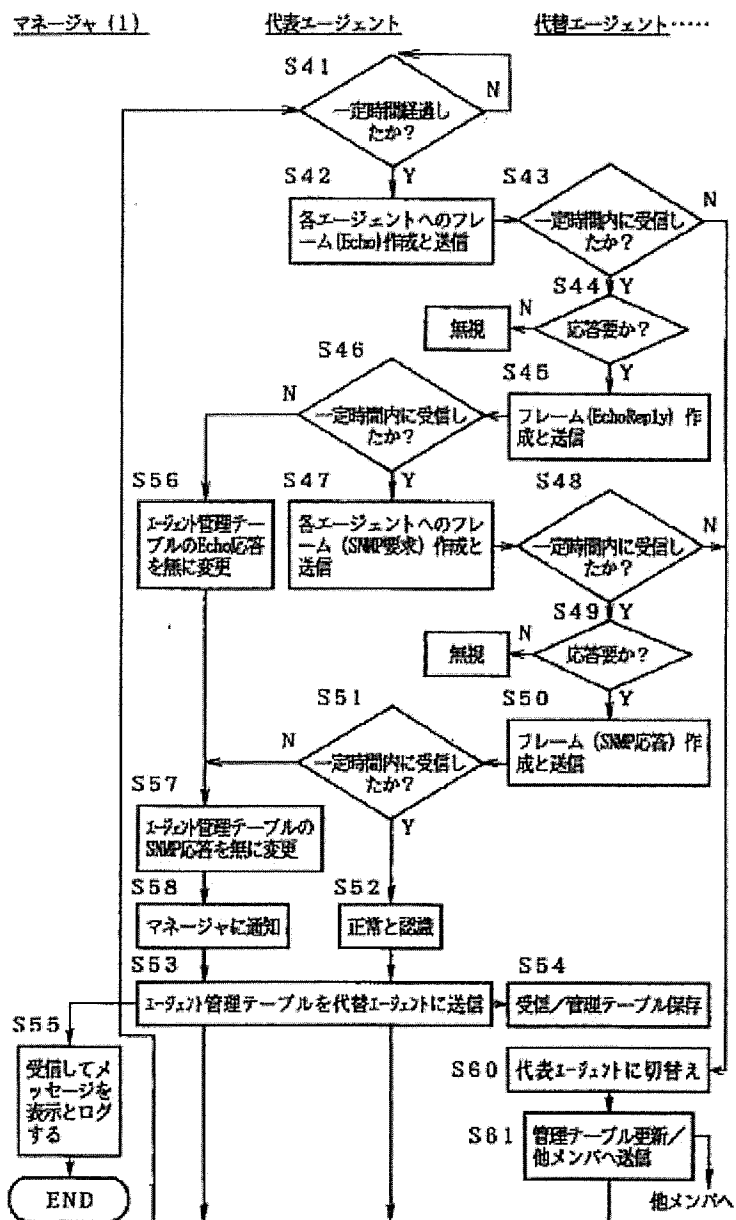
(d) フレーム (SNMP応答)

宛先アドレス	送信元アドレス	プロトコルデータ
#00	#11	GetResponsePDU: PDU応答データ

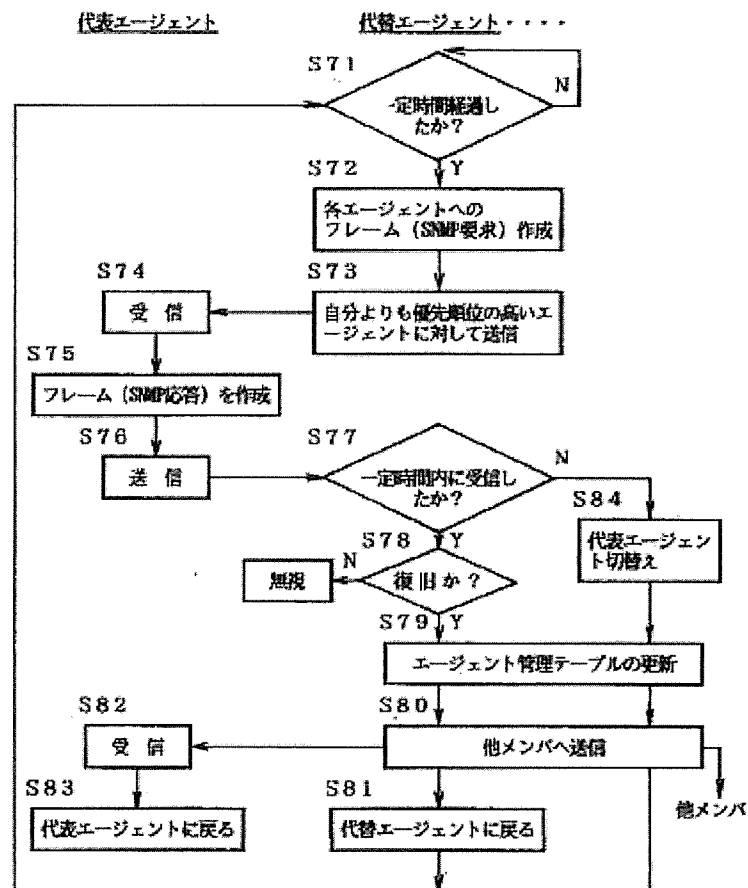
(e) フレーム (エージェント)

宛先アドレス	送信元アドレス	エージェントデータ
#13	#00	代表エージェント: #13
代表エージェント		代替エージェント: #12...
		優先順位: (1) #13 (2) #12...
		監視時間間隔: T1

Drawing 8



Drawing 9



Drawing 10

